भारतीय मानक

IS 17939 : 2022

Indian Standard

4-नोनिलफिनोल — विशिष्टि

4-Nonylphenol — Specification

ICS 71.080.90

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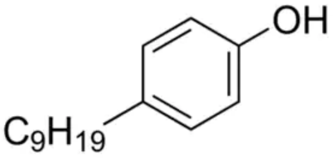
September 2022 **Price Group 3**

Organic Chemicals, Alcohols and Allied Products Sectional Committee, PCD 9

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Organic Chemicals, Alcohols and Allied Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

4-Nonylphenol is an organic compound consisting of *n*-nonyl group, with molecular formula $C_{15}H_{24}O$. Other common names of 4-Nonylphenol are 4-*n*-Nonylphenol, *p*-Nonylphenol and *p*-(*n*-nonylphenol). The material is represented by the following structural formula :



Molecular formula : $C_{15}H_{24}O$

Molecular weight : 220.35 g/mol

In general, the term 'Nonylphenol' represents a large number of isomeric compounds of the general formula $C_9H_{19}.C_6H_4(OH)$. Nonyl group (C_9H_{19}) may be branched (*p*-Nonylphenol) in a variety of ways or be a straight chain (like in 4-*n*-Nonylphenol) and may be located at either the 2-, 3- or 4-position of the benzene ring. Of these potential isomers, 4-Nonylphenol (CAS No. 84852-15-3) is the most commercially important and is one of the important major constituents in the mixture of commercial 'Nonylphenol'.

4-Nonylphenol is not available as pure compound, it is always found in mixtures with other structural isomers, having branched structure (CAS No. 84852-15-3) as major component.

Nonylphenol is a highly used chemical, mainly as an intermediate in the production of phenol/formaldehyde resins, in the manufacturing of nonylphenol ethoxylates, raw material for surfactants, additives in fuels and lubricate. It is also reported that lower alkyl phenol is present as an impurity in commercial grade nonylphenol.

Nonylphenol persists in aquatic environments and is moderately bio-accumulative. It is not readily biodegradable, and it can take months or longer to degrade in surface waters, soils, and sediments. Nonylphenol accumulates and persists in sewage sludge, river sediments, and other environmental compartments. Nonylphenol is toxic to aquatic organisms.

Based on the recommendations of Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizer, the Committee has decided to formulate Indian Standard on 4-Nonylphenol.

The composition of the Committee, responsible for the formulation of this standard is given at Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

4-NONYLPHENOL — SPECIFICATION

1 SCOPE

This standard prescribes the requirements, the methods of sampling and testing of 4-nonylphenol.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards given below:

IS No.	*Title*
1070 : 1992	Reagent grade water — Specification (*third revision*)
2362 : 1993	Determination of water by karl fischer method — Test method (*second revision*)
2552 : 1989	Steel Drums (galvanized and ungalvanized) — Specification (*third revision*)
5299 : 2001	Methods of sampling and tests for dye intermediates (*first revision*)
8768 : 2000	Method of measurement of colour in liquid chemical products platinum - cobalt scale (*second revision*)

3 REQUIREMENTS

3.1 Description

The material shall be in the form of viscous colourless liquid.

3.2 The material shall also comply with the requirements given in Table 1, when tested according to the methods prescribed in col 4 and col 5 of the Table 1.

Table 1 Requirements for 4-Nonylphenol
(*Clauses* 3.2, 5.3.1, 5.3.2 and 6.1)

Sl No.	**Characteristic**	**Requirement**	**Method of Test, Ref to**	
			IS	**Annex**
(1)	(2)	(3)	(4)	(5)
i)	Colour, Pt-Co, *Max*	50	IS 8768[1)]	—
ii)	Assay of Nonylphenol (*o*-nonyl phenol and *p*-nonylphenol), percent by mass, *Min*	99	—	A
iii)	Para-nonylphenol content, percent by mass, *Min*	90	—	A
iv)	Di-nonylphenol content, percent by mass, *Max*	1	—	A
v)	Free phenol content, percent by mass, *Max*	0.1	—	A
vi)	Moisture content, ppm, *Max*	1 000	IS 2362[1)]	—

NOTE
1) Automated methods complying to the procedure of the above-mentioned test methods may also be used.

4 PACKING AND MARKING

4.1 Packing

The material shall be packed in galvanized drum and HDPE drums (*see* IS 2552) or as agreed to between the purchaser and the supplier. Each container shall be securely closed.

4.2 Marking

4.2.1 Each container shall bear legibly and indelibly the following information:

a) Name of the material;
b) Name of manufacturer and his recognized trade-mark, if any;
c) Net mass of material;
d) Month and year of the manufacture;
e) Batch or lot number; and
f) Any other statutory requirements.

4.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

5 SAMPLING

5.1 The method of drawing representative samples of the material shall be drawn as prescribed in **4** of IS 5299.

5.2 Numbers of Tests

5.2.1 Tests for the determination of assay shall be conducted on the individual samples.

5.2.2 Tests for the determination of remaining characteristics, namely, description, *p*-nonylphenol content, di-nonylphenol, free phenol content and moisture content shall be conducted on the composite sample.

5.3 Criteria for Conformity

5.3.1 *For Individual samples*

The lot shall be declared as conforming to the requirement of assay if each of the individual test results as obtained in **5.2.1** satisfies the relevant requirements given in Table 1.

5.3.2 *For Composite sample*

For declaring the conformity of the lot to the requirements of all other characteristics (**5.2.2**) tested on the composite sample, the test results for each of the characteristics shall satisfy the relevant requirements given in **3** and Table 1.

6 TEST METHODS

6.1 Tests shall be carried out according to the methods referred in col 4 and col 5 of Table 1.

6.2 Quality of Reagents

Unless specified otherwise, ‘pure chemicals’ and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — ‘Pure chemicals’ shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

[*Table* 1, *Sl No.* (ii), (iii), (iv) *and* (v)]

DETERMINATION OF *p*-NONYLPHENOL CONTENT AND ITS IMPURITIES (ASSAY) BY GAS CHROMATOGRAPHY (GC)

A-1 OUTLINE OF METHOD

This procedure is used to determine assay of *p*-nonylphenol (PNP). Capillary gas chromatography is used to determine the percentage of PNP and its impurities. Quantitative results are achieved through direct area percent normalization. The major impurities assayed by this procedure are free phenol, *o*-nonylphenol (ONP), and di-nonylphenol (DNP).

A-2 APPARATUS

A-2.1 Gas Chromatograph

Any gas chromatograph equipped with a flame ionization detector (FID), a split-splitless injector and a suitable electronic integrator/software can be used with following accessories and operating condition:

A-2.1.1 *Column*

Capillary column with (5 percent-phenyl)-methylpolysiloxane nonpolar phase with 30 m length, 0.32 mm internal diameter, 0.25 µm film thickness and 350°C maximum temperature or equivalent column.

A-2.1.2 *Carrier gas*, nitrogen grade 5.0 (purity 99.999 percent).

A-2.1.3 *Injection port information*

Injection Mode	*Temperature*	*Column Flow*	*Purge Flow*	*Split Ratio*	*Injection Volume*
Split	300°C	50.4930 kPa (7.3234 psi)	5.0 ml/min	80 : 1	0.5 µl

A-2.1.4 *Column oven information*

Initial Temp.	*Equilibration time*	*Total Program Time*
60 °C	0.00	33.5 min

A-2.1.5 *Column oven temperature program*

Rate (°C/min)	*Temperature (°C)*	*Hold Time (min)*
–	60	2
20	290	20

A-2.1.6 *Auto injection information*

Rinses with Solvent (pre Run)	*Rinses with Solvent (post Run)*	*Rinses with Sample*	*Plunger speed*	*Viscosity Comp. Temp*	*Plunger Speed*	*Syringe Inserting Speed*
6	6	6	High	0.2 s	High	High

NOTE — The above gas chromatographic (GC) conditions are suggestive. However, any GC method having difference in detector, column packing material and type (like packed / capillary, diameter, length, film thickness etc.), calibration technique (internal standard, external standard, area normalization, percent area etc.), carrier gas (He, H_2, N_2) may be used with applicable GC operating parameters, provided standardization and calibration of the components is established after setting GC parameters for the resolution and accuracy level as specified in this standard.

A-3 PROCEDURE OF ANALYSIS

Take the 10 percent sample in the dilution flask and dilute with methanol (HPLC grade). Inject 0.5 µl. Run the chromatogram. Calculate the percentage composition by area normalization with response factor 1.00.

A-4 CALCULATION

Take value of nonylphenol and its impurities by percent area normalization method.

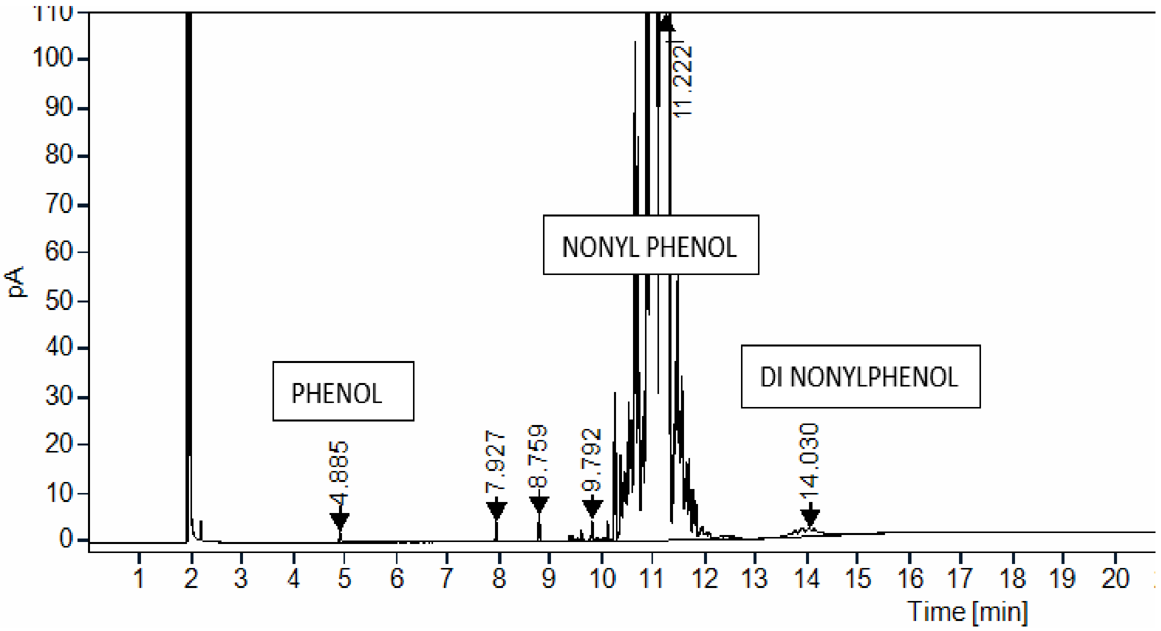


FIG 1 TYPICAL CHROMATOGRAM

Name	*RT*	*Area*	*Area percent*	*Height*	*Height percent*	*Peak integration type*
Free Phenol	4.885	5.34	0.049	2.09	0.23	MM m
Alkyl Phenol Isomer	7.927	11.81	0.108	4.11	0.45	MM m
Alkyl Phenol Isomer	8.759	10.4	0.095	5.48	0.6	MM m
Alkyl Phenol Isomer	9.792	33.47	0.307	4.44	0.48	MM m
PNP (Ortho + Para)	11.222	10781.45	98.935	903.74	98.08	MM m
Di-nonylphenol	14.03	55.07	0.505	1.59	0.17	MM m
	Sum =	10897.54				

NOTE — 'MM m' stands for 'Million minutes'

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Organic Chemicals, Alcohols and Allied Products Sectional Committee, PCD 09

Organization	*Representative(s)*
Chemical Engineering and Process Development Division, NCL, Pune	Dr C. V. Rode **(*Chairman*)**
Alkyl Amines Chemicals Limited, Mumbai	Shri S. V. Nikumbhe Shri Sameer Katdare (*Alternate*)
All India Alcohol-Based Industries Development Association (AABIDA), Mumbai	Shri K. L. Raphael Shri Kirti Gajjar (*Alternate)*
All India Distillers Association (AIDA), New Delhi	Shri V. N. Raina
BASF India Limited, Mumbai	Shri Kiran Bhat Shri Hemal (*Alternate)*
CSIR- Central Drug Research Institute (CDRI), Lucknow	Dr Sanjeev Kanojiya
Chemical And Petrochemicals Manufacturers Association (CPMA), New Delhi	Shri Mahinder Singh
Deepak Fertilizer, New Delhi	Dr L. B. Yadawa Shri Suresh Amle (*Alternate)*
Deepak Phenolics Limited, Vadodara	Shri Dharmesh Siddhapuria Shri Sandip Kumar Pandya (*Alternate)*
Dow Chemical International Private Limited, Mumbai	Shri V. Mohandoss Shri Govind Gupta (*Alternate)*
Godavari Biorefineries, Mumbai	Shri Shanul Laxmanrao Pagar Shri Appasaheb J. Wani (*Alternate)*
Gujarat Narmada Valley Fertilizers Company Limited, Ahmedabad	Dr R.M. Patel Shri C. S. Patel (*Alternate)*
Hindustan Organic Chemicals Limited (HOCL), Mumbai	Shri Deleep Kumar. K Shri V. Mohan (*Alternate)*
India Glycols Limited, Uttarakhand	Dr R.K. Sharma Shri Alok Singhal (*Alternate)*
Indian Chemical Council (ICC), Mumbai	Dr Mritunjay Chaubey Shri J Sevak (*Alternate)*
Indian Oil Corporation Limited, Panipat	Dr Y. S. Jhala
Jubilant Life Sciences Limited, Noida	Shri Hari Mohan Lohani
Laxmi Organic Industries, Mumbai	Shri J. P. Suryavanshi Dr Vijay S. Mishra (*Alternate)*
Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers, New Delhi	Shri O. P. Sharma Shri Varun Singh Poonia (*Alternate)*

Organization	*Representative(s)*
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National Test House (NTH) , Kolkata	SHRI DEBASHIS SAHA DR GOPAL KRISHAN (*Alternate)*
Reliance India Limited (RIL), Mumbai	SHRI SREERAMACHANDRAN KARTHA SHRI VASANT WARKE (*Alternate)*
United Phosphorus Limited (UPL), Mumbai	SHRI M. D. VACHHANI
In Personal Capacity (*37 Nandanvan Society, Near GNFC Township, Narmadanagar, Bharuch, Gujarat – 392015*)	DR MAYUR J. KAPADIA
BIS Directorate General	SHRIMATI MEENAL PASSI, Scientist 'E' And Head (Pcd) [Representing Director General (*Ex-Officio)]*

Member Secretary
MS ADITI CHOUDHARY
Scientist 'B' (PCD), BIS

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This Indian Standard has been developed from Doc No.: PCD 09 (18967).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi